997085

R & D CATALOG FORM

DATE: 5 January 1965

1. PROJECT TITLE/CODE NAME: Optical Dipoles

2. SHORT PROJECT DESCRIPTION: A study to determine the feasibility of developing a "light amplifying screen" utilizing dipolar suspension.

25X1A

5. CLASS OF CONTRACTOR: Manufacturer

6. TYPE OF CONTRACT: CPFF

7. FUNDS: FY 1965 [redacted]

25X1A

FY 19 $

FY 19 $

8. REQUISITION NO.: NA

9. BUDGET PROJECT NO.: NP-V-6

10. EFFECTIVE CONTRACT DATE (Begin - end): March 1965-Sept 1965

11. SECURITY CLASS.: A.A. - Conf. T - Unclass. W - Unclass.

12. RESPONSIBLE DIRECTORATE/OFFICE/PROJECT OFFICER TELEPHONE EXTENSION

25X1A

DDI/NPIC/R&DS/ [redacted]

13. REQUIREMENT/AUTHORITY: If this study is successful, this type of screen will have application in all devices which employ rear-projection screens.

14. TYPE OF WORK TO BE DONE: Applied Research

15. CATEGORIES OF EFFORT

MAJOR CATEGORY	SUB-CATEGORIES
Viewers and Other Interpretation Equipment	Interpretation/Analysis Photo Reconnaissance Visual

16. NEW SYSTEM OR SERVICES FROM THIS CONTRACT/IMPROVEMENT OVER CURRENT SYSTEM, EQUIPMENT, ETC.: Breadboard and final report/reduce radiation required to be transmitted through the imagery.

17. SUPPORTING OR RELATED CONTRACTS (Agency & Other)/COORDINATION: By virtue of contacts throughout industry and the intelligence community, it has been determined that no study using these principles is now being performed.

18. DESCRIPTION OF INTELLIGENCE REQUIREMENT AND DETAILED TECHNICAL DESCRIPTION OF PROJECT (Continue on additional page if required) Present viewing systems are limited by the amount of energy that must pass through the imagery that is being projected onto the screen. Since more light per unit area is needed as magnification is increased, magnification is limited by the heat absorbed in the emulsion. One way to overcome this limit would be to develop a screen that would control a bright light source in proportion to the weak image falling on it. It is felt that the [redacted] proposal describes a technique which could be used to develop a screen of this type. 25X1

The purpose of this program is to study the feasibility of utilizing a dipolar

19. APPROVED BY AND DATE

OFFICE	DEPUTY DIRECTOR	DDCI

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18. suspension for a high-intensity, dynamic display of highly magnified, projected images. (The particular technique proposed utilized a proprietary application of optical dipoles.)

After feasibility has been established, a prototype light amplifying screen will be constructed and tested. This screen may have a direct application to present viewers.

There are many questions that must be answered before it is possible to say that such a device will have a direct application to present viewing devices. The main goal of the study is to determine the level of energy transmitted by the film that is required to control the dipole suspension. That is, with this type of system, will less energy be required to pass through the film than with present systems?

The dipole screen is constructed so that an electric field may be applied across the screen aligning the dipoles to allow light to pass through the screen. If ultra-violet illumination is projected onto the screen, the dipoles are ionized and the ions migrate to the faces where they shield the electric field. The space thus illuminated is free of the electric field and the dipoles in this area are returned to random orientation by Brownian movement. This random orientation prevents the transmission of light through the screen at this point and this portion of the screen appears dark. Thus, if one projects a negative film on the screen, its positive will be reproduced.

An auxiliary light source, in the visible range, is flooded on the screen, thus increasing the brightness of the image projected by ultra-violet. Only enough energy to activate the dipoles must be transmitted by the film. The high-intensity light that is necessary for high-magnification is not projected through the film but from the auxiliary source.

The purpose of this study is to determine whether this principle offers a ...n over existing systems. In order to answer the main question, the following should first be determined:

A. What level of energy is needed to control the dipole suspension?

B. How does the auxiliary illumination affect the dipole suspension?

C. How much energy is lost after it is transmitted through the film and before it causes the dipoles to react?

D. How fast will the dipoles react after illuminated and how fast will they return to their original state?

E. Is there any migration of the image after it has been formed?

F. What is the quality of the image?

1. The Modulation Transfer Function.

2. The density range

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18. 3. The density discrimination.

It is anticipated that the study proposed [redacted] will provide the comprehensive experimental data required to answer these questions. 25X1A